

Claims

We Claim:

- 5 1. A method of multiattribute analysis and optimization for providing automated measurements of the importance of attributes and attribute values of message alternatives and for, in an automated manner, preferentially in real-time, improving the stage-to-stage performance of said message alternatives in a multi-stage message campaign in an interactive measurable medium; said method including:
 - 10 obtaining historical information including historical performance data for message performance for at least one previous stage of said campaign;
 - generating a multiattribute system that describes said message alternatives in terms of said attributes and said attribute values;
 - determining the importance of said attributes and said attribute values to the performance of said message alternatives;
 - 15 optimizing campaign performance through allocation of message alternatives to visitors during said message campaign; and
 - determining a next allocation for each new visitor for a next stage of the campaign.
- 20 2. A method as in claim 1, further comprising: processing said historical performance data to identify erroneous or possibly erroneous or unusual historical performance data.
- 25 3. A method as in claim 2, wherein said processing further including cleaning said historical performance data to correct said identified erroneous or possible erroneous or unusual historical performance data.

4. A method as in claim 3, further comprising discounting at least a portion of said historical performance data from said at least one previous stage to grant more weight to more recent historical performance data than to less recent historical performance data.

5. A method as in claim 1, further comprising discounting at least a portion of said historical performance data from said at least one previous stage to grant more weight to more recent historical performance data than to less recent historical performance data.

6. A method as in claim 5, wherein said historical information further includes historical information selected from the set consisting of a visitor identifier, a message alternative identifier for the message alternative shown to said visitor, a type of action or types of actions taken by each said visitor, and a payoff for each of the actions taken by said visitors.

7. A method as in claim 1, wherein said historical information further includes historical information selected from the set consisting of a visitor identifier, a message alternative identifier for the message alternative shown to said visitor, a type of action or actions taken by each said visitor, and a payoff for each of the action or actions taken by said visitors.

8. A method as in claim 6, wherein said historical information further includes additional information selected from the set consisting of: a message type, a message type and a corresponding alternative clicked on by a visitor, a web site and a section of the web site where the visitor was presented with and saw or had an opportunity to see a banner ad, a time of the visitors visit, a visitor demographic information, a

visitor psychographic information, a visitor demographic profile, a visitor psychographic profile, and combinations thereof.

5 9. A method as in claim 7, wherein said historical information further includes additional information selected from the set consisting of: a message type, a message type and a corresponding alternative clicked on by a visitor, a web site and a section of the web site where the visitor was presented with and saw or had an opportunity to see a banner ad, a time of the visitors visit, a visitor demographic information, a visitor psychographic information, a visitor demographic profile, a visitor psychographic profile, and combinations thereof.

10 10. A method as in claim 1, wherein said historical information includes additional information selected from the set consisting of: a message type, a message type and a corresponding alternative clicked on by a visitor, a web site and a section of the web site where the visitor was presented with and saw or had an opportunity to see a banner ad, a time of the visitors visit, a visitor demographic information, a visitor psychographic information, a visitor demographic profile, a visitor psychographic profile, and combinations thereof.

15 20 11. A method as in claim 1, further comprising:

processing said historical data to identify and correct any erroneous data;

discounting at least a portion of said performance data from said at least one previous stage to grant more weight to more recent performance data than to less recent performance data; and

25 said historical information further includes: information selected from the set consisting of: a visitor identifier, a message alternative identifier for the message alternative shown to said visitor, a type of action or actions taken by said visitor, and a payoff for each of the actions taken by said visitors, a

message type, a message type and a corresponding alternative clicked on by a visitor, a web site and a section where the visitor was presented and saw a banner ad, a time of the visitors visit, a visitor demographic information, a visitor psychographic information, a visitor demographic profile, a visitor psychographic profile, and combinations thereof.

12. A method as in claim 11, wherein said message alternative is selected from a group of message alternatives consisting of: an email, an ad, a banner ad, a banner, a splash page, a home page, a jump page, a landing page, media programming, media content, a political campaign message, a survey, a poll, a news headline, a headline, a ballot measure, a ballot initiative, one or more sports scores, one or more sports scores for a local, regional, collegiate, or amateur sports team or teams, and combinations thereof.

13. A method as in claim 1, wherein said message alternative is selected from a group of message alternatives consisting of: an email, an ad, a banner ad, a splash page, a home page, a jump page, a landing page, media programming, media content, a political campaign message, a survey, a poll, a news headline, a headline, a ballot measure, a ballot initiative, one or more sports scores, one or more sports scores for a local, regional, collegiate, or amateur sports team or teams, and combinations thereof.

14. A method as in claim 1, wherein each exposure of a message alternative to a visitor results in a payoff result, a performance of said message alternative for a visitor segment being based at least in part on the expected value of the payoff results for the visitors for that visitor segment, said payoff result being a function of a measurement including at least one measurement selected from the set of measurements consisting of: a number of actions, a number of signups, a number of purchases, a binary result, a value of purchases, a revenue amount, a sales amount, a profit amount, a continuous function of a continuous variable, a continuous function of a discontinuous variable, a continuous function of a binary variable, a discrete function of a continuous variable,

a discrete function of a discontinuous variable, a discrete function of a binary variable, and combinations thereof.

15. A method as in claim 12, wherein each exposure of a message alternative to a visitor results in a payoff result, a performance of said message alternative for a visitor segment being based at least in part on the expected value of the payoff results for the visitors for that visitor segment, said payoff result being a function of a measurement including at least one measurement selected from the set of measurements consisting of: a number of actions, a number of signups, a number of purchases, a binary result, a value of purchases, a revenue amount, a sales amount, a profit amount, a continuous function of a continuous variable, a continuous function of a discontinuous variable, a continuous function of a binary variable, a discrete function of a continuous variable, a discrete function of a discontinuous variable, a discrete function of a binary variable, and combinations thereof.

16. A method as in claim 14, wherein said multiattribute method comprises:

generating at least one report on the optimal value for each attribute;

generating new message alternatives with the values of each attribute indicated by a multiattribute analysis that uses prior expectations and payoff criteria to arrive at message alternative evaluation;

adding said new message alternatives to the set of available messages to be optimized; and

choosing the best message alternative from among the choices presented and proactively creating message alternatives that are expected to perform well within some confidence level.

17. A method as in claim 16, wherein said multiattribute system is of standard form.

18. A method as in claim 16, wherein said multiattribute system is reduced to standard form.

5 19. A method as in claim 16, wherein said processing includes discounting said performance data; and said discounting being achieved using at least one of discounting scheme selected from the set of discounting schemes consisting of: a geometric discounting scheme, a linear weighting discounting scheme, a non-linear weighting discounting scheme, and combinations thereof.

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20. A method as in claim 1, wherein said processing includes discounting said performance data; and said discounting being achieved using at least one of discounting scheme selected from the set consisting of: a geometric discounting scheme, a linear weighting discounting scheme, a non-linear weighting discounting scheme, and combinations thereof.

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21. A method as in claim 19, wherein said processing includes estimating the distribution of the expected payoff of future performance of said message alternatives.

20 22. A method as in claim 21, wherein said estimate is obtained under the assumption that the underlying performance model implied by said multiattribute system holds.

25 23. A method as in claim 21, wherein said estimate is obtained by first estimating the distribution of expected payoff of future performance of said message alternatives assuming said underlying performance model implied by said multiattribute system holds, then updating the second said estimate to remove said assumption.

24. A method as in claim 21, wherein said estimate is employed for the purpose of allocating future campaign impressions amongst said message alternatives to optimize future expected campaign performance.

5 25. A method as in claim 19, wherein said allocation method comprises performing a pairwise comparison procedure among said plurality of message alternatives.

26. A method as in claim 25, wherein said pairwise comparison comprises:

10 computing an expected value of a payoff distribution of each message alternative and an error in said payoff distribution expected value; and

comparing in pairwise manner the expected value based statistic of a selected message alternative with the same expected value based statistic for each other of the message alternatives.

15 27. A method as in claim 26, wherein said pairwise comparison comprises:

selecting a first message alternative and a second message alternative from among said plurality of message alternatives;

20 computing a quotient determined as difference between the estimate of the said expected value divided by a standard error in the difference between the estimate of the expected value for each of said first and second message alternatives; and

determining if said difference is within a predetermined magnitude relationship of, including greater than, a threshold cutoff value c_1 , and: (i) if said difference is within said predetermined magnitude relationship of said threshold cutoff value, then identifying the second selected message alternative as a member of a non-contending message class.

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28. A method as in claim 27, further comprising:

assuming that each message alternative is a content;

repeating said selecting, said computing a quotient, said computing a difference,
and said determining for other all other pairs of said message alternatives on a pairwise
basis so that when all possible pairwise comparisons have been made each message
5 alternative will have been sorted into one contender and said non-contender classes.

29. A method as in claim 28, further comprising performing said repeating for all other
pairs of message alternatives on a pairwise basis for each optimization.

10 30. A method as in claim 28, wherein said pairwise comparison procedure further
comprises initially uniformly allocating said message alternatives prior to performing
a first optimization.

15 31. A method as in claim 27, wherein said allocation algorithm comprises a pairwise
comparison, said message alternatives are sorted into a contender class and a non-
contender class, and for at least one identified stage in a messaging campaign all
visitors are allocated equally among message alternatives belonging to said contender
class, and no visitors are allocated to message alternatives belonging to said non-
contender class.

20 32. A method as in claim 31, wherein said at least one identified stage comprises an
initial stage.

25 33. A method as in claim 31, wherein said at least one identified stage comprises a
plurality of stages.

34. A method as in claim 31, wherein said at least one identified stage comprises all stages.

35. A method as in claim 25, wherein said allocation algorithm comprises a pairwise
5 comparison, and message alternatives are sorted into more than two classes.

36. A method as in claim 35, wherein said messages belonging to each said class are assigned different numbers of visitors.

10 37. A method as in claim 35, wherein said messages belonging to each said class are assigned substantially the same numbers of visitors.

38. A method as in claim 25, wherein said allocation algorithm comprises a pairwise
15 comparison, and message alternatives are sorted into more than two classes and the allocation among contenders is not equal.

39. A method as in claim 25, wherein said allocation algorithm comprises a pairwise
20 comparison, and message alternatives are sorted into more than two classes and the allocation among non-contenders is not equal.

40. A method as in claim 25, wherein said allocation algorithm comprises a pairwise
25 comparison, and message alternatives are sorted into more than two classes and the allocation among contenders is not equal and the allocation among non-contenders is not equal.

41. A method as in claim 27, wherein said allocation algorithm comprises a Pairwise Comparison, and the cutoff c_1 is in the range substantially between 0-1.0.

42. A method as in claim 27, wherein said allocation algorithm comprises a Pairwise Comparison, and the cutoff c_1 is substantially 0.5.

43. A method as in claim 27, wherein said allocation algorithm comprises a Pairwise Comparison, and the cutoff c_1 is greater than or equal to 1.

44. A method as in claim 27, wherein said allocation algorithm comprises a Pairwise Comparison, and the cutoff c_1 is greater than 1.

45. A method as in claim 16, wherein reports on the optimal value for each attribute are provided only if it is determined that said multiattribute system supports said measurement of the relative importance to said message alternative performance of said attributes and said attribute values.

46. A method as in claim 45, wherein said multiattribute system is reduced to standard form to determine if said multiattribute system supports said measurement of the relative importance to said message alternative performance of said attributes and said attribute values.

47. A method as in claim 45, wherein determination of said relative importance to said message alternative performance of said attributes and said attribute values includes determination of confidence intervals around said relative importance.

48. A method as in claim 16, wherein reports on the optimal value for each attribute are provided only if it is determined that said multiattribute system and said performance data warrant said measurement of the relative importance to said message alternative performance of said attributes and said attribute values.

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49. A method as in claim 48, wherein an acceptance/rejection test is employed to determine if said multiattribute system and said performance data warrant said measurement of the relative importance to said message alternative performance of said attributes and said attribute values.

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50. A method as in claim 48, wherein reports on said relative importance to said message alternative performance of said attributes and said attribute values are provided to the marketing manager or other interested party.

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51. A method as in claim 48, wherein determination of said relative importance to said message alternative performance of said attributes and said attribute values includes determination of confidence intervals around said relative importance.

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52. A method as in claim 50, wherein said performance measurement represents the click-through rates of the message alternatives, said multiattribute function is the logodds function, and said reported relative importance to said message alternative performance of one of said attribute values is computed as $100 \times (\exp\{u\} - 1)$, where said u represents a parameter estimate of a multiattribute parameter associated with said attribute value, and said reported relative importance to said message alternative performance of one of said attributes is computed as $100 \times (\exp\{u\} - 1)$, where said u represents the largest parameter estimate of a multiattribute parameter associated with said attribute values of said attribute.

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53. A method as in claim 52, wherein said reports include a chart and a table.

54. A method as in claim 53, wherein said chart is a bar chart where the length of the bars are determined by said reported relative importance of said attributes or said attribute values.

55. A method as in claim 54, wherein the colors of said bars are determined by assigning each attribute a color, and whenever an attribute or a value of said attribute appears on a chart, coloring said bar with said color.

56. A method as in claim 54, wherein the colors of said bars are determined by, when reporting on an attribute, using one color if the lower confidence bound of the best attribute value for said attribute is less than zero, and using a second color otherwise; and likewise when reporting on an attribute value, using one color if the lower confidence bound of said attribute value is less than zero, and using a second color otherwise.

57. A method as in claim 54, wherein the colors of said bars are determined by assigning each attribute a color and each attribute value a variant of the color assigned to its attribute, and whenever an attribute or an attribute value appears on a chart, coloring said bar with said color.

58. A computer program product for use in conjunction with a computer system, the computer program product comprising a computer readable storage medium and a computer program mechanism embedded therein, the computer program mechanism comprising: a program module that directs the computer system and/or components thereof, to function in a specified manner to provide automated measurements of the importance of attributes and attribute values of message alternatives and to, in an

automated manner, preferentially in real-time, improve the stage-to-stage performance of said message alternatives in a multi-stage message campaign in an interactive measurable medium, the program module including instruction for:

5 obtaining historical information including performance data for message performance for at least one previous stage of said campaign;

generating a multiattribute system that describes said message alternatives in terms of said attributes and said attribute values;

determining the relative importance of said attributes and said attribute values to the performance of said message alternatives;

10 optimizing campaign performance through allocation of message alternatives to visitors during said message campaign; and

determining a next allocation for each new visitor for a next stage of the campaign.

15 59. A computer program product as in claim 58, wherein said program module further including instructions for:

processing said historical data to identify and correct any erroneous data;

20 discounting at least a portion of said performance data from said at least one previous stage to grant more weight to more recent performance data than to less recent performance data; and wherein:

said historical information further includes additional information selected from the set consisting of: a visitor identifier, a message alternative identifier for the message alternative shown to said visitor, a type of action or actions taken by said visitor, and a
25 payoff for each of the actions taken by said visitors, a message type, a message type and a corresponding alternative clicked on by a visitor, a web site and a section where the visitor was presented and saw a banner ad, a time of the visitors visit, a visitor

demographic information, a visitor psychographic information, a visitor demographic profile, a visitor psychographic profile, and combinations thereof.

5 60. A computer program product as in claim 58, wherein said message alternatives are selected from a group consisting of: an email, an ad, a banner ad, a splash page, a home page, a jump page, a landing page, media programming, media content, a political campaign message, a survey, a poll, a news headline, a headline, a ballot measure, a ballot initiative, one or more sports scores, one or more sports scores for a local, regional, collegiate, or amateur sports team or teams, and combinations thereof.

10 61. A system for providing automated measurements of the importance of attributes and attribute values of message alternatives and for, in an automated manner, preferentially in real-time, improving the stage-to-stage performance of said message alternatives in a multi-stage message campaign in an interactive measurable medium, said system comprising:

15 historical information gathering means for obtaining historical information including performance data for message performance for at least one previous stage of said campaign;

20 multiattribute system generation means for generating a multiattribute system that describes said message alternatives in terms of said attributes and said attribute values;

first processing means for determining the relative importance of said attributes and said attribute values to the performance of said message alternatives;

second processing means for optimizing campaign performance through allocation of message alternatives to visitors during said message campaign; and

25 message alternative allocation means for determining a next allocation for each new visitor for a next stage of the campaign.

62. A system as in claim 61, wherein said first and second processing means further comprise a server having a processor and associated memory.

5 63. A system as in claim 62, wherein said system further comprises input/output means including a connection to a network.

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